

Seasonality of the Butterfly Fauna in Southeastern Vietnam (Papilionoidea)

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Abstract. The butterfly fauna of the semi-arid savanna parts of S.E. Vietnam express a pronounced seasonality. The abundance of 49 species was recorded during the wet and dry seasons. Migratory behavior and/or slow development during the dry season seem to be frequent attributes of bionomic strategy in the monsoon seasonal climate. In some species, such as *Mycalesis* spp. and *Precis atlites* (L.), a certain type of dormancy (diapause?) is a probable adaptation during the dry season. The insect seasonality is modified or even disappearing in wetlands, gallery forests and irrigated areas of the savanna region.

Introduction

The western Phan Rang Plain (S. E. Vietnam) is characterized by a variety of seminatural savanna and human modified habitats conditioned by the seasonal monsoon climate. So far, the seasonality of tropical insects have been investigated in Africa (Denlinger, 1980; Owen, 1971) and in Central America (Janzen & Schoener, 1968; Wolda, 1978; Tanaka, 1982; Young, 1982). No seasonal data are available from South East Asia (cf. Seitz, et al., 1927; Corbet, Pendlebury & Eliot, 1978—with bibliography). With regard to the territory near Phan Rang, S. E. Vietnam, even basic entomofaunistic research is badly needed (see Zeleny, Spitzer & Ondracek, 1982). The aim of the present paper is to provide new data referring to insect seasonality in the tropics, particularly with regard to the monsoon climate in S. E. Asia.

Field Observations and Records

The study was carried out during three weeks of the maximum rainfall period of the wet season (October 1980) and again at the end of the dry season (April 1982) near Nha-Ho on the Phan Rang Plain. The abundance of the butterfly families Papilionidae, Pieridae, Danaidae, Satyridae and Nymphalidae was estimated daily between 8 and 11 a.m. in the human modified savanna habitats with small patches of semideciduous monsoon forest (Table 1). On the average, the rarest species (one to five specimens per day observed) are marked by X, and the most common species (over 50 specimens) by XXX. *Melanitis leda* (L.) was observed usually in the evenings.

Table 1. Abundance of butterflies of the Phan Rang Plain, Nha-Ho, S.E. Vietnam.

| Family and Species | Wet Season | Dry Season | Family and Species | Wet Season | Dry Season |
|---------------------------------------|--------------|------------|---|--------------|------------|
| | October 1980 | April 1982 | | October 1980 | April 1982 |
| Papilionidae | | | Satyridae | | |
| <i>Troides aeacus</i> (Feld.) | XX | X | <i>Melanitis leda</i> (L.) | XX | XX |
| <i>Pachliopta aristolochiae</i> (F.) | XXX | XX | <i>Mycalesis mineus</i> (L.) | XXX | 0 |
| <i>Papilio demoleus</i> L. | X | XX | <i>Mycalesis visala</i> Moore | XX | 0 |
| <i>Papilio polytes</i> L. | XX | XX | Nymphalidae | | |
| <i>Papilio memnon</i> L. | X | X | <i>Ariadne ariadne</i> (L.) | XX | XX |
| <i>Graphium agamemnon</i> (L.) | X | X | <i>Vindula erota</i> (F.) | 0 ? | X |
| Pieridae | | | <i>Terinos clarissa</i> Bsd. | 0 | XXX |
| <i>Leptosia nina</i> (F.) | XXX | X | <i>Precis hedonia</i> (L.) | XX | 0 |
| <i>Delias descombesi</i> (Bsd.) | XX | X | <i>Precis atlites</i> (L.) | XXX | 0 |
| <i>Delias hyparte</i> (L.) | XX | XX | <i>Precis almana</i> (L.) | XXX | XXX |
| <i>Cepora nerissa</i> (F.) | X | 0 | <i>Precis lemonias</i> (L.) | XXX | XX |
| <i>Appias libythea</i> (F.) | XXX | XXX | <i>Precis orithya</i> (L.) | X | X |
| <i>Phrisura aegis</i> (Feld.) | X | X | <i>Hypolimnas bolina</i> (L.) | XX | XX |
| <i>Ixias pyrene</i> (L.) | XXX | XXX | <i>Neptis hylas</i> (L.) | XXX | XX |
| <i>Hebomoia glaucippe</i> (L.) | XXX | XX | <i>Neptis magadha</i> Feld. | X | X |
| <i>Pareronia anais</i> (Lesss.) | XXX | X | <i>Euthalia lubentina</i> (Cr.) | X | X |
| <i>Coopsilia pyranthe</i> (L.) | XXX | X | <i>Polyura athamas</i> (Drury) | X | 0 |
| <i>Catopsilia pomona</i> (F.) | XXX | XXX | Riodinidae | | |
| <i>Catopsilia scylla</i> (L.) | X | X | <i>Zemeros flegyas</i> (Cr.) | X | X |
| <i>Eurema brigitta</i> (Stoll) | X | X | Lycaenidae (only part of the family checked) | | |
| <i>Eurema hecabe</i> (L.) | XXX | XXX | <i>Castalius rosimon</i> (F.) | XX | XX |
| Danaidae | | | <i>Caleta roxus</i> (Godart) | X | X |
| <i>Danaus chrysippus</i> (L.) | XXX | XXX | <i>Zizula hylax</i> (F.) | XXX | X |
| <i>Danaus genutia</i> (Cr.) | X | X | <i>Catochrysops strabo</i> (F.) | XX | XX |
| <i>Tirumala septentrionis</i> (Butl.) | XX | X | <i>Curetis tagalica</i> (Feld.) | XX | X |
| <i>Radena similis</i> (L.) | XXX | XX | | | |
| <i>Euploea sylvestr</i> (F.) | X | XX | | | |
| <i>Euploea mulciber</i> (Cr.) | 0 | X | | | |
| <i>Euploea midamus</i> (L.) | XXX | XX | | | |

X = rare (1 to 5 specimens per day), X = frequent, XXX = common (over 50 specimens per day), 0 = no occurrence. Nomenclature from Corbet, Pendlebury & Eliot (1978).

The Environment of the Phan Rang Plain

The investigated part of the Phan Rang Plain is a slightly elevated country, about 100-200 m altitude, situated 15-20 km to the west of the coastline of the South China Sea. The local climate is semi-arid with a long dry period from late November until April, with a limited amount of rainfall in May and June. The typical wet monsoon period near Nha-Ho is restricted mostly to October (see Schmid, 1974 and Vidal, 1979, Fig. 1).

Meteorological conditions during the periods of my butterfly investigations were in October 1980 (wet season): Air temperatures were min. 22.5°C at night, max. 33.2°C by day and mean around 27.0°C, rainfall total was 77.2 mm with a peak from 14th to 22nd October. The dry period temperatures in April 1982 were min. 22.7°C at night, max. 37.7°C by day and mean around 28.4°C. There was no rainfall after November 1981 except for a very short rain shower not exceeding 1 mm. The above meteorological data from 1980 and 1982 were supplied by the Nha-Ho Agricultural Station. A long-term climatic diagram of the coastal zone of Phan Rang was published by Schmid (1974) and Vidal (1979), showing an average annual total precipitation of 693 mm.

The vegetation of the Phan Rang Plain near Nha-Ho is described by Thai Cong Tung (1966) and briefly also by Schmid (1974). The typical formation is the lowland savanna forest and dry tropical grassland with dominant shrubs and trees of the genera *Capparis*, *Zizyphus*, *Diospyros*, *Albizzia* and *Calotropis*. Characteristic insect seasonality seems to be closely associated with grasses (Poaceae). Derived agro-ecosystems and ruderal habitats are supplied by the irrigation water, causing a less pronounced seasonal pattern. A great number of savanna butterflies is attracted by introduced exotic shrubs, such as *Lantana camara* L.

Results and Discussion

Results of my observations are summarized in Table 1. A remarkable seasonality, possibly induced by a certain type of dormancy during the dry season, seems to be associated with the life cycles of *Leptosia nina* (F.), *Pareronia anais* (Less), *Mycalesis* spp., *Precis atlites* (L.) and *Polyura athamas* (Drury). Larvae of these Oriental species mostly feed on deciduous plants and the observed seasonality agrees with similar observations from the African savanna region (Owen, 1971; Larsen, Riley & Cornes, 1979; Denlinger, 1980) and from seasonal districts of Central America (Young, 1982). Remarkable alternation of abundance during the dry and wet season was not observed in the savanna species that manifest seasonal forms, e.g., in *Precis almana* (L.), *P. lemonias* (L.), *Danaus chrysippus* (L.)—associated with *Calotropis*, and *Ixias pyrene* (L.), which are probably well adapted to the semi-arid monsoon climate. Most frequently observed species, with relatively small differences in abundance during the dry and wet period (Table 1), are obligatorily associated with evergreen food plants, such as *Papilio polytes* (L.), *Pachliopta aristolochiae* (F.), *Appias lybithea* (F.), *Danaus chrysippus* (L.).

Some observed species of the genera *Catopsilia* and *Euploea* are typical migratory butterflies (see Williams, 1930). The migratory behavior of *Terinos clarissa* (Bsd.) has not been definitely recorded until now. This species was an abundant migrant at the end of dry season in late April and early May in the Phan Rang Plain (migratory movement mostly from NE to



Fig. 1. The savanna near Nha-Ho, Phan Rang Plain. Dominant shrubs are *Capparis beneolens* Gagn., *Zizyphus oenoplia* Mill. and *Diospyros chevalieri* H.Lec., October 1980, wet season.

W and SW). Migrations seem to be an important attribute of bionomic strategy in a seasonal monsoon climate.

The abundance of *Troides aeacus* (Feld.), the most remarkable Phan Rang butterfly, decreases during the dry season. This species showing a typical territorial behavior of males and many features of the stenotopic K-selection strategy, can safely survive dry seasons in relatively humid groves of gallery forests or clumps of trees with Aristolochiaceae near streams (Spitzer, 1982). In the open dry savanna, this species is often endangered by bush fire, besides other human factors. Seasonal differences in abundance were found in Macroheterocera, e.g. in some Noctuidae and Arctiidae, observed in the Phan Rang area as well. Adaptations to the savanna seasonal climate in S.E. Asia are typical for certain taxa of Lepidoptera and probably date from the last glacial pleistocene periods, as pointed out by Holloway (1982).

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